IN THE CLAIMS:

The text of all pending claims, (including withdrawn claims) is set forth below. Cancelled and not entered claims are indicated with claim number and status only. The claims as listed below show added text with underlining and deleted text with ~~strikethrough~~. The status of each claim is indicated with one of (original), (currently amended), (cancelled), (withdrawn), (new), (Original), or (not entered). Please AMEND claims 37-40, and 79-80, and CANCEL claims 1-13, 35-36, 41-75, 78, and 81-82, without prejudice or disclaimer, in accordance with the following:

Claims 1-13 (CANCELED)

14. (Original) A data modulating method of modulating m-bit source data into n-bit, wherein $n \geq m$, and m and n are positive integers, code words where a minimum run length limit is confined to "d" and a maximum run length limit is confined to "k", wherein "d" and "k" are positive integers, the data modulating method comprising:

multiplexing an input data stream divided by a predetermined length into a plurality of types of pseudo random data streams using multiplexed information of predetermined bits by applying a predetermined multiplexing method to each of the pseudo random data streams; and

RLL-modulating the plurality of types of pseudo random data streams to create a modulated code stream in which an optimal DC suppression is performed.

15. (Original) The data modulating method of claim 14, wherein the random data streams are generated by inconsecutively scrambling the input data stream using the multiplexed information.

16. (Previously Presented) The data modulating method of claim 15, wherein when s_t is multiplexed information used to multiplex the input data stream divided into v data streams each having a u-byte length, a number a of bits of the multiplexed information s_t is less than or equal to a number m of bits of input source data, wherein u and v are positive integers.

17. (Original) The data modulating method of claim 16, wherein the generation of random data streams comprises:

performing an exclusive OR operation on the multiplexed information s_t and first m-bit data of a first code modulation unit of the plurality of types of random data streams to generate modulated data;

outputting data unchanged from a second code modulation unit to a $q\text{-}1^{th}$ code modulation unit without performing an exclusive OR operation;

performing an exclusive OR operation on the first code modulation unit and a q^{th} code modulation unit to generate next modulated data; and

repeating an exclusive OR operation from the q^{th} code modulation unit to a final code modulation unit of the input data stream.

18. (Previously Presented) The data modulating method of claim 17, wherein when an exclusive OR operation cycle is q, where q is a positive integer, an error propagation probability is reduced to 1/q.

19. (Original) The data modulating method of claim 14, further comprising:

dividing the input data stream into the predetermined length;

inserting a sync pattern into the multiplexed pseudo random data streams to which the multiplexed information is added in the generation of the random data streams and converting the multiplexed information into multiplexed IDs; and

comparing the plurality of types of RLL-modulated code streams to select the code stream comprising the minimum of DC components.

20. (Original) A data modulating method of modulating m-bit source data into n-bit, wherein $n \geq m$, and m and n are positive integers, code words where a minimum run length limit is confined to “d” and a maximum run length limit is confined to “k”, wherein "d" and "k" are positive integers, the data modulating method comprising:

multiplexing an input data stream divided by a predetermined length into a plurality of types of pseudo random data streams using multiplexed information of predetermined bits by applying a predetermined multiplexing method to each of the pseudo random data streams; and

weak DC-free RLL-modulating the multiplexed data streams without using a DC control code conversion table comprising additional bits and providing a code stream comprising a minimum of DC components among multiplexed, RLL-modulated code streams.

21. (Original) The data modulating method of claim 20, wherein the pseudo random data streams are generated by inconsecutively scrambling the input data stream using the multiplexed information.

22. (Previously Presented) The data modulating method of claim 21, wherein s_t is multiplexed information used to multiplex the input data stream divided into v data streams each having a u-byte length, a number a of bits of the multiplexed information s_t is less than or equal to a number m of bits of input source data, wherein u and v are integers.

23. (Original) The data modulating method of claim 22, wherein the generation of the pseudo random data streams comprises:

performing an exclusive OR operation on the multiplexed information s_t and first m-bit data of a first code modulation unit of the plurality of types of pseudo random data streams to generate modulated data;

outputting data unchanged from a second code modulation unit to a $q\text{-}1^{th}$ code modulation unit without performing an exclusive OR operation;

performing an exclusive OR operation on the first code modulation unit and a q^{th} code modulation unit to generate next modulated data; and

repeating an exclusive OR operation from the q^{th} code modulation unit to a final code modulation unit of the input data stream.

24. (Previously Presented) The data modulating method of claim 23, wherein when an exclusive OR operation cycle is q , where q is a positive integer, an error propagation probability is reduced to 1/q.

25. (Original) The data modulating method of claim 20, further comprising:

dividing the input data stream into the predetermined length;

inserting a sync pattern into the multiplexed pseudo random data streams to which the multiplexed information is added in generation of the random data streams and converting the multiplexed information into multiplexed IDs; and

comparing the plurality of types of RLL-modulated code streams to select the code stream comprising the minimum of DC components.

26. (Original) The data modulating method of claim 20, wherein the weak DC-free RLL modulation is performed by generating code words complying with a predetermined RLL condition and grouping the code words according to the predetermined RLL condition using a main code conversion table in which code words are arranged so that a stream of source words has a DC control capability and using a DC control sub code conversion table which is made by taking unnecessary code words complying with the predetermined RLL condition out of the main code conversion table.

27. (Original) The data modulating method of claim 26, wherein the minimum run length limit "d" is 1 and the maximum run length limit "k" is 7.

28. (Original) The data modulating method of claim 26, wherein in the weak DC-free RLL modulation, code words of same data in main code groups and in DC control auxiliary code groups, have opposite INV values to control a DC, and INV is a parameter predicting a transition direction of a next code word depending on whether a number of bits of value "1" in a code word stream is odd or even.

29. (Original) The data modulating method of claim 26, wherein the main code conversion table comprises code word groups that satisfy conditions of $0 \leq EZ \leq 5$, $1 \leq LZ \leq 7$, $0 \leq LZ \leq 4$, and $0 \leq LZ \leq 2$, wherein EZ is end zeros indicating a number of successive zeros from least significant bits to most significant bits in a code word and LZ is lead zeros indicating a number of successive zeros from most significant bits to least significant bits.

30. (Original) The data modulating method of claim 29, wherein one of the code groups of the main code conversion table comprising source codes less than a minimum number of code words to be modulated is prepared by removing redundant code words from one of the code groups comprising code words greater than the minimum number so that code words greater than the minimum number are retained.

31. (Original) The data modulating method of claim 26, wherein the DC control sub conversion table comprises:

a group comprising code words satisfying $6 \leq EZ \leq 7$ and $LZ \neq 0$, redundant code words of a first main code group, and "1010xxxxxxxx" code words satisfying $6 \leq EZ \leq 7$ and $LZ = 0$;

a group comprising code words satisfying $6 \leq EZ \leq 7$ and $0 \leq LZ \leq 6$, code words satisfying $0 \leq EZ \leq 5$ and $5 \leq LZ \leq 6$, and redundant code words of a second main code group, the group from which "1010xxxxxxxx" code words satisfying $6 \leq EZ \leq 7$, $LZ = 0$ are removed, wherein EZ is end zeros indicating a number of successive zeros from most significant bits to least significant bits and LZ is lead zeros indicating a number of successive zeros from most significant bits to least significant bits; and

a group comprising code words complying with $6 \leq EZ \leq 7$ and $0 \leq LZ \leq 3$, code words satisfying $0 \leq EZ \leq 5$ and $LZ = 3$, and redundant code words of a third main code group.

32. (Previously Presented) The data modulating method of claim 31, wherein when a stream of code words a, b1, and c, and a stream of code words a, b2, and c make a pair and the code words b1 and b2 are code words having opposite INV characteristics in the DC control sub code conversion table, although the code word a, b1, b2, or c is converted due to a violation against a predetermined run length limit/boundary rule between the stream of the code words a , b1, and b2 and the stream of the code words b1, b2, and c, code words are arranged in the main code conversion table and the DC control sub code conversion table so that a modulated stream of code words a, b1, and c and a modulated stream of code words a, b2, and c have opposite INV characteristics.

33. (Original) The data modulating method of claim 26, wherein the minimum run length limit "d" is 2 and the maximum run length limit "k" is 10.

34. (Original) The data modulating method of claim 25, wherein the multiplexed IDs satisfy the minimum run length limit "d" of 2 and the maximum run length limit "k" of 7 to increase a minimum mark length to reduce interferential noise of a signal.

Claims 35 - 36 (CANCELED)

37. (Withdrawn) A method of arranging m-bit source data into n-bit, where $n \geq m$, and n and m are positive integers, code words by confining a minimum run length limit "d" to 1 and a maximum run length limit "k" to 7, where "d" and "k" are positive integers, the method comprising:

when a code word a is connected to a code word b, the code word a is a preceding code word, the code word b is selected from code words b1 and b2, a code stream in which the code word a is connected to the code word b1 is X1, and a code stream in which the code word a is connected to the code word b2 is X2, arranging the code words b1 and b2 to have opposite parameters INV predicting a transition of a next code depending on whether a number of bits of value "1" in a code word is odd or even; and

when the code word a is connected to the code word b1 or b2, although the code word a, b1, or b2 is modulated into another type of code word according to a boundary rule, arranging the code streams X1 and X2 to have opposite parameters INV.

38. (Withdrawn) The method of claim 37, wherein when a number of bits of value "0" between the code word a and the code word b1 and between the code word a and the code word b2 is less than the minimum run length limit "d"-1, the code word a, b1, or b2 is modified according to the boundary rule to arrange the code words a, b1, and b2 so that a number of bits of value "0" between the modified code word a and the modified code word b1 and between the modified code word a and the modified code word b2 is greater than or equal to the minimum run length limit "d"-1 and less than or equal to the maximum run length limit "k"-7.

39. (Withdrawn) The method of claim 37, wherein the code word a in the code stream X1 and the code word a in the code stream X2 are each converted into another type of code word according to the boundary rule to have the same INV value so that the code streams X1 and X2 have opposite INV values due to INV values of the code words b1 and b2.

40. (Withdrawn) A method of arranging m-bit source data into n-bit, wherein $n \geq m$, and n and m are positive integers, code words by confining a minimum run length limit "d" to 1 and a maximum run length limit "k" to 7, where "d" and "k" are positive integers, the method comprising:

when a code word b is connected to a code word c, the code word b is a preceding code word, the code word b is selected from code words b1 and b2, a code stream in which the code word b1 is connected to the code word c is Y1, and a code stream in which the code word b2 is connected to the code word c is Y2, the code words b1 and b2 are arranged to have opposite parameters INV predicting a transition of a next code depending on whether a number of bits of value "1" in a code word is odd or even; and

when the code word b1 or b2 is connected to the code word c, although the code word b1, b2, or c is modulated into another type of code word according to a boundary rule, arranging the code streams Y1 and Y2 to have opposite parameters INV.

Claims 41 - 75 (CANCELED)

76. (Original) A computer-readable medium having computer-executable instructions for performing operations of a data modulating method of modulating m-bit source data into n-bit, wherein n ≥ m and m and n are positive integers, code words where a minimum run length limit is confined to "d" and a maximum run length limit is confined to "k", wherein "d" and "k" are positive integers, the operations comprising:

multiplexing an input data stream divided by a predetermined length into a plurality of types of pseudo random data streams using multiplexed information of predetermined bits by applying a predetermined multiplexing method to each of the pseudo random data streams; and

RLL-modulating the plurality of types of pseudo random data streams to create a modulated code stream in which an optimal DC suppression is performed.

77. (Original) A computer-readable medium having computer-executable instructions for performing operations of a data modulating method of modulating m-bit source data into n-bit, wherein n ≥ m and m and n are positive integers, code words where a minimum run length limit is confined to "d" and a maximum run length limit is confined to "k", wherein "d" and "k" are positive integers, the operations comprising:

multiplexing an input data stream divided by a predetermined length into a plurality of types of pseudo random data streams using multiplexed information of predetermined bits by applying a predetermined multiplexing method to each of the pseudo random data streams; and

weak DC-free RLL-modulating the multiplexed data streams without using a DC control code conversion table comprising additional bits and providing a code stream comprising a minimum of DC components among multiplexed, RLL-modulated code streams.

78. (CANCELED)

79. (Withdrawn) A computer-readable medium having computer-executable instructions for performing operations of a method of arranging m-bit source data into n-bit, where n ≥ m and n and m are positive integers, code words by confining a minimum run length limit "d" to 1 and a maximum run length limit "k" to 7, where "d" and "k" are positive integers, the operations comprising:

when a code word a is connected to a code word b, the code word a is a preceding code word, the code word b is selected from code words b1 and b2, a code stream in which the code word a is connected to the code word b1 is X1, and a code stream in which the code word a is connected to the code word b2 is X2, arranging the code words b1 and b2 to have opposite parameters INV predicting a transition of a next code depending on whether a number of bits of value "1" in a code word is odd or even; and

when the code word a is connected to the code word b1 or b2, although the code word a, b1, or b2 is modulated into another type of code word according to a boundary rule, arranging the code streams X1 and X2 to have opposite parameters INV.

80. (Withdrawn) A computer-readable medium having computer-executable instructions for performing operations of a method of arranging m-bit source data into n-bit, wherein n ≥ m and n and m are positive integers, code words by confining a minimum run length limit "d" to 1 and a maximum run length limit "k" to 7, where "d" and "k" are positive integers, the operations comprising:

when a code word b is connected to a code word c, the code word b is a preceding code word, the code word b is selected from code words b1 and b2, a code stream in which the code word b1 is connected to the code word c is Y1, and a code stream in which the code word b2 is connected to the code word c is Y2, the code words b1 and b2 are arranged to have opposite parameters INV predicting a transition of a next code depending on whether a number of bits of value "1" in a code word is odd or even; and

when the code word b1 or b2 is connected to the code word c, although the code word b1, b2, or c is modulated into another type of code word according to a boundary rule, arranging the code streams Y1 and Y2 to have opposite parameters INV.

Claims 81-82 (CANCELED)